Visualizing Competitive Behaviors in Multi-User Virtual Environments

Nate Hoobler
Greg Humphreys
Maneesh Agrawala

Andrew Cherry

February 21, 2007
Problem

- Computer games have become very complex and don’t offer spectators a good way to view all of the game’s important details.
Games of Yesterday

- Ball position
- Ball direction
- Paddle positions
- Score
Games of Today

- Teams
  - Members
  - Objectives Completed

- Players
  - Name
  - Position
  - Direction
  - Ammo
  - Class
  - Health
  - Weapons Owned
  - Weapon Selected
  - Weapon Fire Mode
  - Weapon Temperature
  - A.I. Characters
    - Type
    - Health
Motivation

- Currently, game support for observer modes is limited, and does not allow spectators to understand the complex evolution of the game.

- Observers need the big picture.
Through The Eyes
Over The Shoulder/Chase Camera
Floating Phantom Player
Automated Camera Control

Spectator

Automated Cinematographer for games

Next Media Research
Microsoft Research
April 2002

Steven Drucker, Steve DeMar,
Curtis Wong, Asta Glatzer, Steve Glenner
Analytical Visualization
Approach

- Where are players of each team concentrating?
- How is a team organizing itself?
- Where are players likely to run into opposition?
- Where is conflict occurring?
- What are the tactical details of this conflict?
- How did the current game state come to be?
Implementation: Lithium

- Local Visualizations
  - Player Glyphs
  - Player Paths
  - Tracer Fire
  - Fields of View

- Global Visualizations
  - Occupancy
  - Support Fire
  - Medic Efficacy
Overhead View
Player Glyphs
Player Paths
Tracer Fire / Field of View
Modal Coloring

T = presence threshold
t1 = team with the strongest presence

if (t1<T) then Dark Red else {
    if (t2<T) then {
        if (shooting) then Orange else Red
    } else {Yellow}
}
Support Fire Coverage Map

Modal Coloring

\[ T = \text{presence threshold} \]

\[
\begin{align*}
\text{if} \ (\text{red}>T) & \\{ \ \text{if} \ (\text{blue}<T) \ \text{and} \ (\text{red}.\text{shooting}) \ \text{then Orange} \\
\text{else} & \ // \ \text{red}<T \ \{ \ \text{if} \ (\text{blue}>T) \ \text{and} \ (\text{blue}.\text{shooting}) \ \text{then Cyan} 
\end{align*}
\]
Medic Efficacy Coverage Map
Evaluation

- “Our experience has been that these visualizations, coupled with a rudimentary understanding of the mechanics of multiplayer team games, allow a novice spectator to easily discover and grasp subtle aspects of matches that even experienced players cannot find with a standard spectating interface.”
Conclusion
Questions

- How effective is this system at conveying game information?

- How fun is it to watch?

- Which view would you prefer to watch?
Questions

○ How well does the visualization display the information the authors said was important?
  ● Where are players of each team concentrating?
  ● How is a team organizing itself?
  ● Where are players likely to run into opposition?
  ● Where is conflict occurring?
  ● What are the tactical details of this conflict?
  ● How did the current game state come to be?
Questions

- What does this accomplish?
- What else could it be used for?
- What else could be added?